This document contains Part 1 (pp.38–52) of Chapter 2

of the National Coastal Condition Report III.

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National Coastal Condition Report III

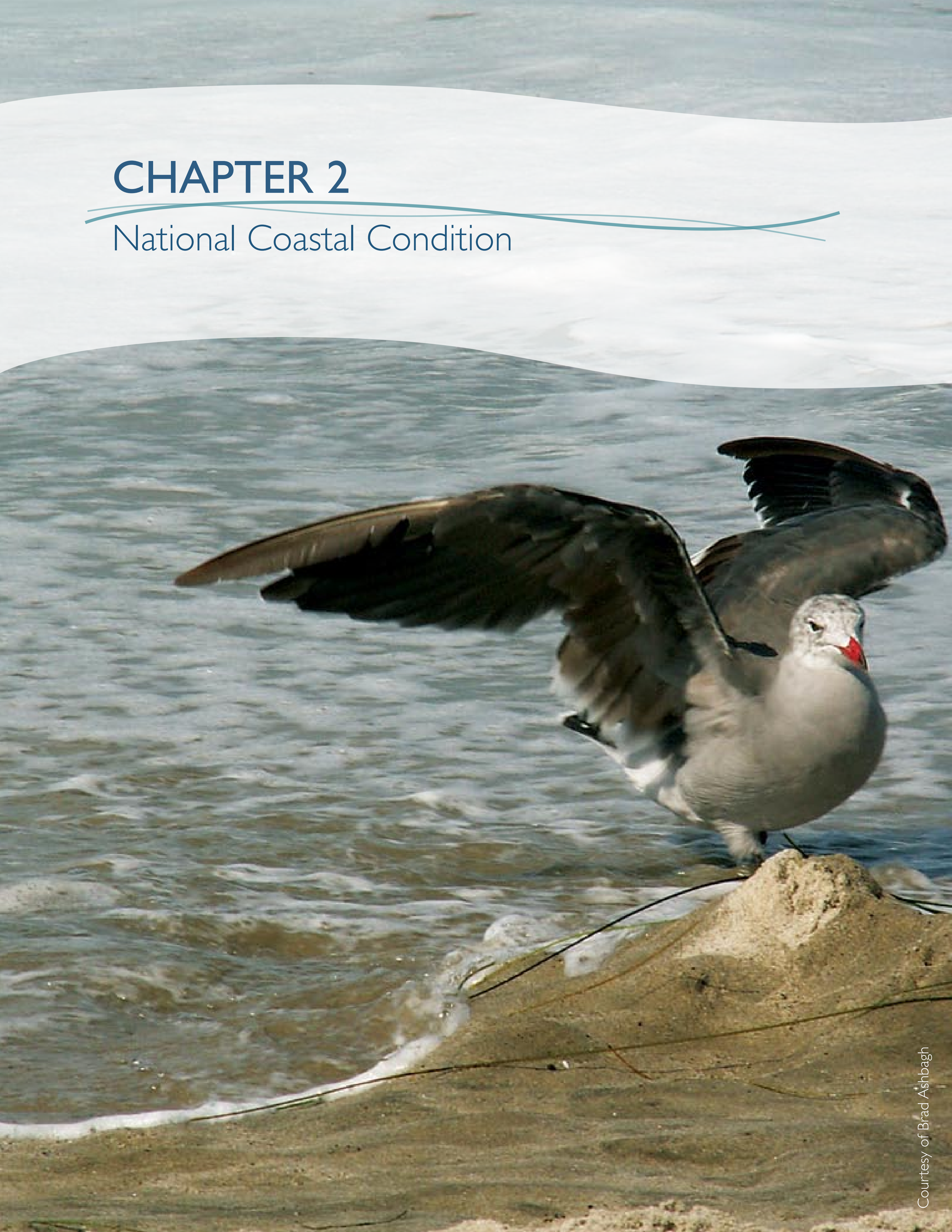
Chapter 2: National Coastal Condition

Part 1 of 5

December 2008

CHAPTER 2

National Coastal Condition



Courtesy of Brad Ashbagh

National Coastal Condition

As shown in Figure 2-1, the overall condition of the nation's coastal waters is rated fair; the water quality index is rated good to fair; the sediment quality and fish tissue contaminants indices are rated fair; the benthic index is rated fair to poor; and the coastal habitat index is rated poor. Figure 2-2 provides a summary of the percentage of coastal area in good, fair, poor, or missing categories for each index and component indicator. This assessment is based on environmental stressor and response data collected between 1998 and 2002 from 2,424 sites in the coastal waters of the 24 coastal states of the conterminous United States; Hawaii; Puerto Rico; and Southcentral Alaska (Figure 2-3). About 85% of these data were collected in 2001 and 2002. Please refer to Chapter 1 for information about how these assessments were made, the criteria used to develop the rating for each index and component indicator, and the limitations of the available data.

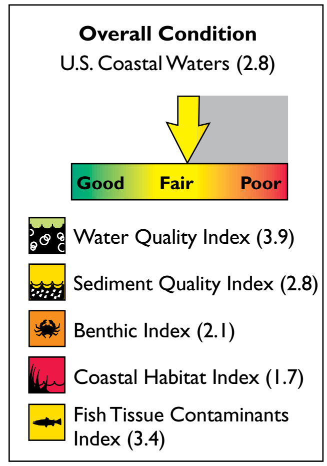
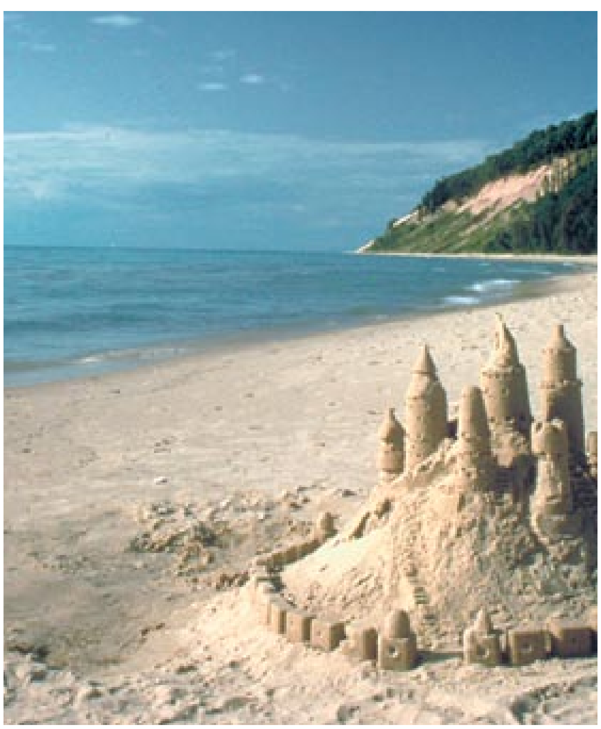


Figure 2-1. The overall condition of U.S. coastal waters is rated fair (U.S. EPA/NCA).



Our nation's coastal waters are important for ecological, recreational, and economic reasons (courtesy of U.S. EPA GLNPO).

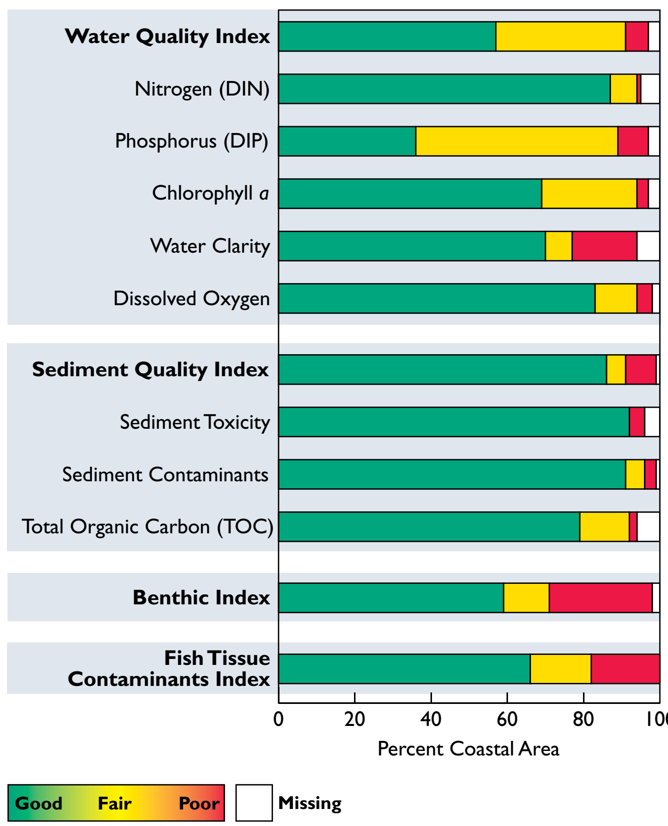


Figure 2-2. Percentage of coastal area achieving each ranking for all indices and component indicators—United States (U.S. EPA/NCA).

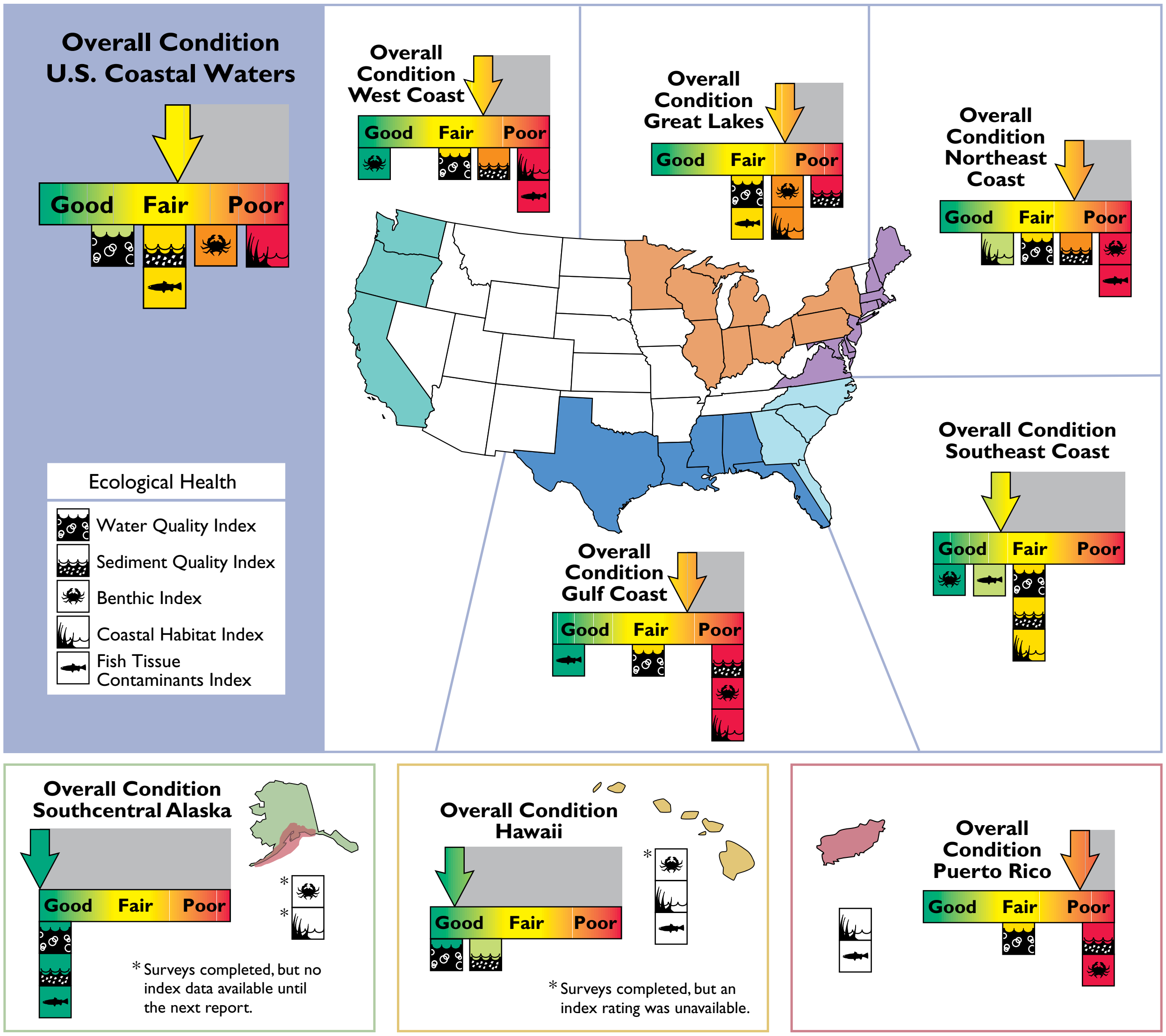


Figure 2-3. Overall national and regional coastal condition based on data collected primarily in 2001 and 2002 (U.S. EPA/NCA).

The condition of U.S. coastal waters was determined for this report by combining assessments from the Northeast Coast, Southeast Coast, Gulf Coast, Great Lakes, and West Coast regions of the conterminous United States with those from Hawaii, Puerto Rico, and Southcentral Alaska (Figure 2-3). It should be noted that the overall condition and index scores for the nation are determined using a weighted average of the regional scores, rather than the percent area rated good, fair, and poor. Southcentral Alaska and Hawaii were not included in the national assessment presented in the NCCR II (U.S. EPA, 2004a) because data were unavailable for the coastal areas of those states. A comparison of coastal condition in 2001 and 2002 based on the inclusion of data for Southcentral Alaska and Hawaii versus coastal condition with these data excluded is provided later in this chapter.

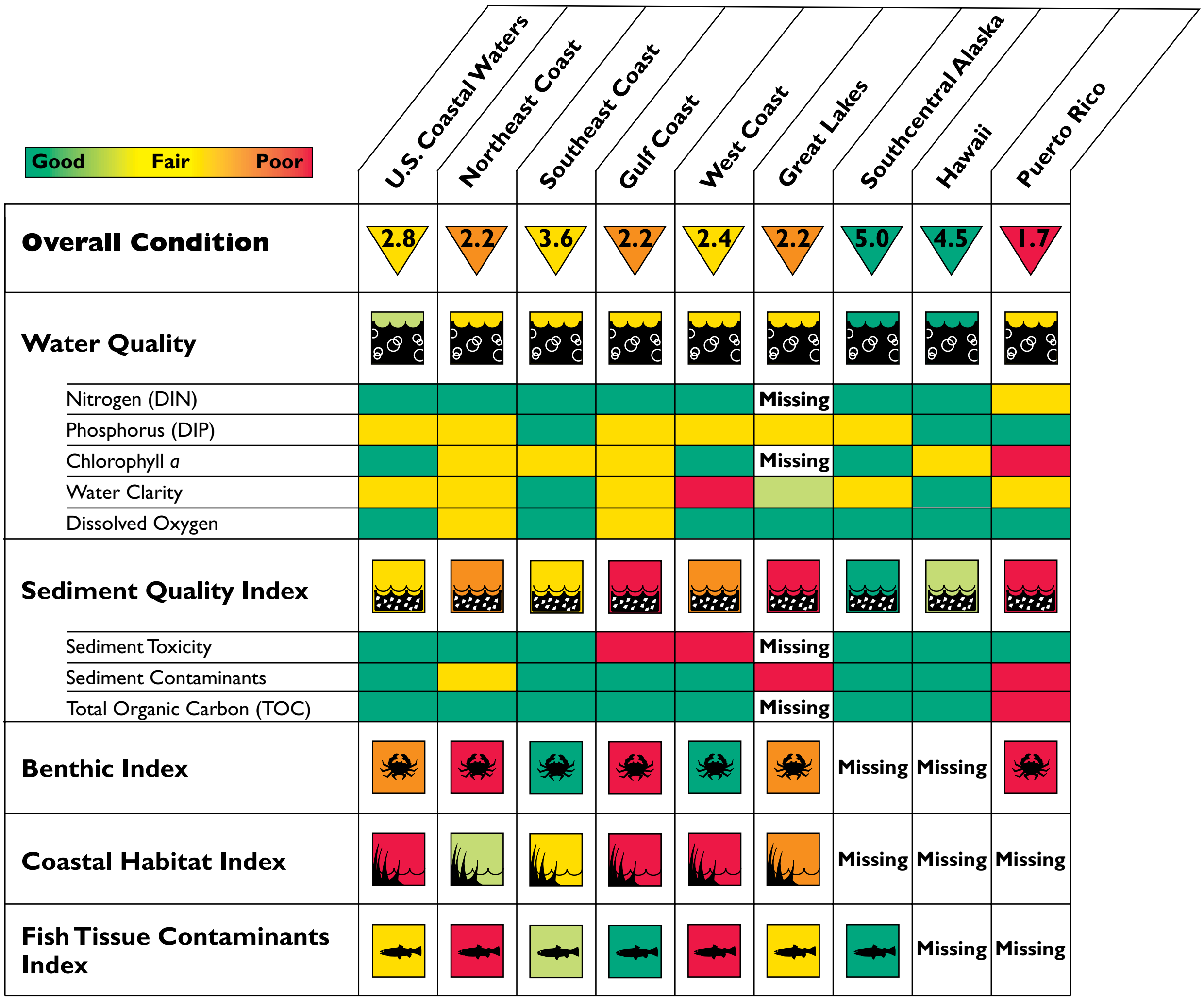


Figure 2-4. Overall national and regional coastal condition, 2001–2002 (U.S. EPA/NCA).

Figure 2-4 summarizes the national (including Hawaii and Southcentral Alaska) and regional condition of the nation's coastal waters. The water quality index is rated fair or good for regions throughout the nation, although the coastal waters of the West Coast region are rated poor for water clarity and the coastal waters of Puerto Rico are rated poor for chlorophyll *a*. The sediment quality index is rated poor for the Gulf Coast, Puerto Rico, and Great Lakes regions; fair to poor for the Northeast Coast and West Coast regions; fair for the Southeast Coast region; good to fair for Hawaii; and good for Southcentral Alaska. The benthic index shows that biological conditions are rated poor in the coastal waters of the Northeast Coast, Gulf Coast, and Puerto Rico regions; fair to poor in the coastal waters of the Great Lakes region; and good in the coastal waters of the West Coast and Southeast Coast regions. The fish tissue contaminants index is rated poor for the coastal waters of the Northeast Coast and West Coast regions; fair for the Great Lakes region; good to fair for the Southeast Coast region; and good for the Gulf Coast and Southcentral Alaska regions.

The population of the nation's collective coastal counties increased by 33 million people between 1980 and 2003 (Figure 2-5), constituting a 28% growth rate (Crossett et al., 2004). This growth rate matched that of the nation's total population, which increased by 63.3 million people during the same time period (U.S. Census Bureau, 2006b); however, because the land area of the nation's coasts comprises roughly 17% of the U.S. total land area, coastal population increases are frequently accompanied by larger population density increases and greater demands for limited resources (Crossett et al., 2004). Figure 2-6 shows the distribution of the U.S. coastal population in 2003.

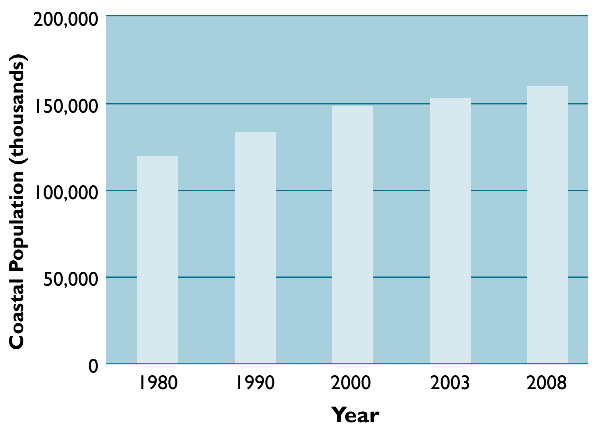


Figure 2-5. Actual and estimated population of U.S. coastal counties, 1980–2008 (Crossett et al., 2004).

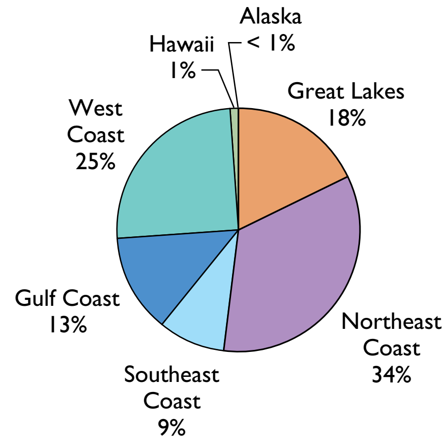


Figure 2-6. Regional distribution of the nation's coastal population in 2003 (Crossett et al., 2004).

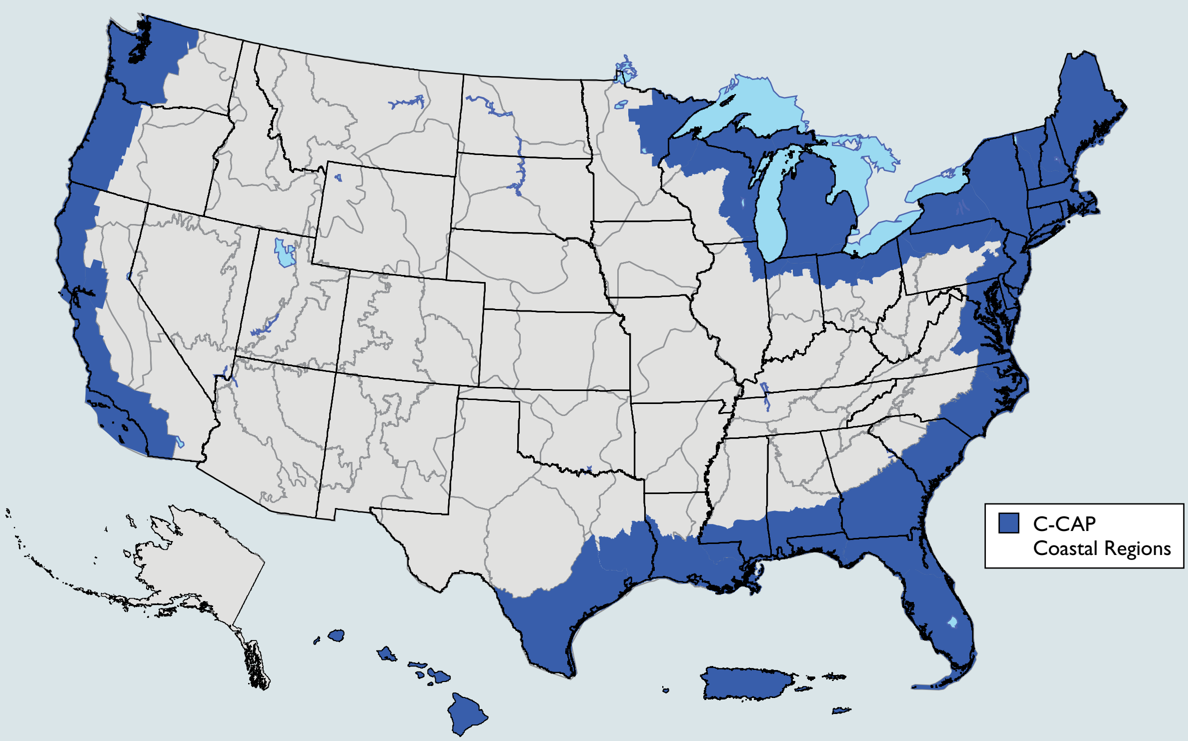
Camden Harbor, ME (courtesy of Patricia A. Cunningham).

Highlight

Monitoring Coastal Land Cover Change

Land cover information helps users gauge current conditions and plays an important role when crafting policies that direct future land-use decisions. Land cover maps document how much of a region is covered by forests, wetlands, agriculture, impervious surfaces, and other land and water types. By comparing maps from various years, users can see how the land surface has changed over time. Instead of viewing changes from the ground, parcel by parcel, users can get the entire view at once and access the information needed to assess current conditions and understand how the community or region is changing.

The National Land Cover Database (NLCD) is an example of a land-coverage data set that is used to generate land-coverage maps on different geographic scales. NLCD 2001 is a second-generation, land-coverage data set that was produced from satellite imagery by the Multi-Resolution Land Characteristics (MRLC) Consortium. The MRLC Consortium was originally created to meet the needs of several federal agencies and became a major provider of land cover information by successfully mapping the conterminous United States based upon early- to mid-1990s Landsat Thematic Mapper imagery. The continuing need for current, accurate, satellite-based information resulted in an expanded MRLC Consortium effort to produce the NLCD 2001 (Homer et al., 2004; MRLC Consortium, 2007).

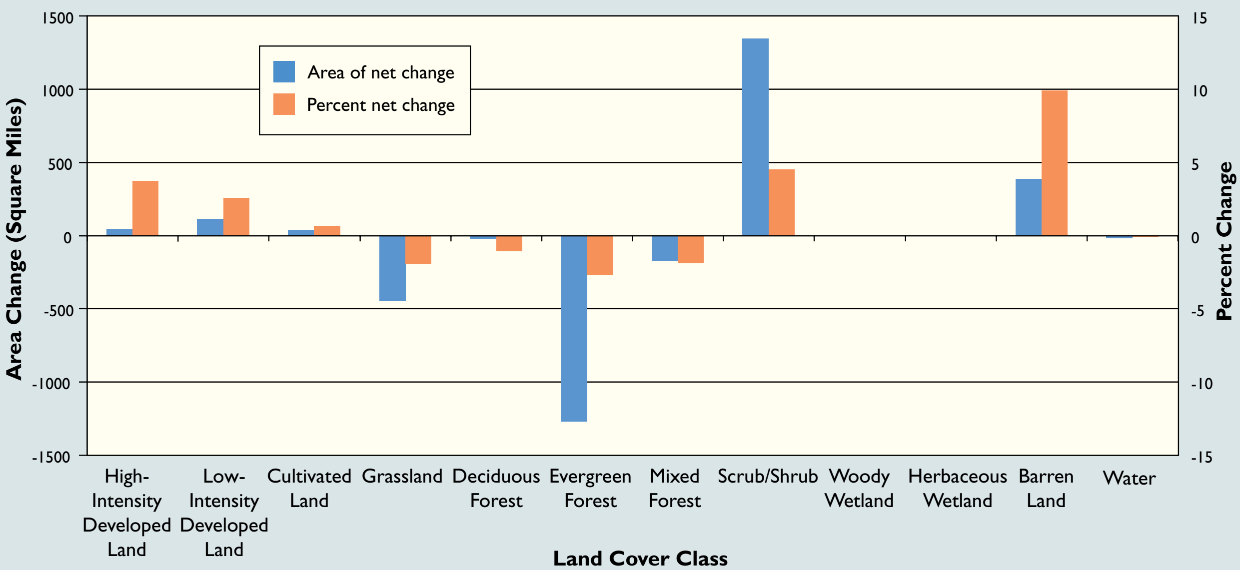


NOAA's Coastal Change Analysis Program (C-CAP) contributes land cover information for coastal regions of the United States (courtesy of NOAA).

NOAA's Coastal Change Analysis Program (C-CAP) contributes to the nationally standardized, moderate-resolution NCLD 2001 database by creating land cover information for the coastal regions of the United States (see map). C-CAP land cover products inventory coastal intertidal areas, wetlands, and adjacent uplands, with the goal of monitoring changes in these habitats on a 1- to 5-year cycle (NOAA, 1995). The program categorizes coastal lands into 29 land cover classes. Recent efforts have led to completed NLCD and C-CAP products for all of the conterminous United States and Hawaii. Additional imagery is being used to track land cover class changes in these areas through time.

For example, the figure shows how West Coast land cover has shifted among 12 land cover classes between 1996 and 2001. In terms of percentage and total area, the largest changes are associated with increases in barren land and scrub/shrub, as well as decreases in evergreen forest cover and grasslands. These changes are largely due to the forest management practices common in the Pacific Northwest and the resulting cycle of harvest and reforestation. During these practices, forests are cut for their timber, and the barren ground is colonized by grasses. The grassland subsequently develops into scrubland and eventually returns to mature forest. Between 1996 and 2001, the net loss in area of evergreen forest along the West Coast exceeded 1,000 mi^2 (NOAA, 2003b).

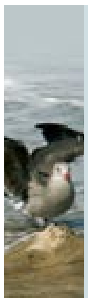
Consistent land cover information at a national scale provides data for a wide variety of analyses and applications. For example, trend information collected as part of this effort provides valuable feedback to managers on the success of policies and programs and helps users gain a better understanding of natural and human-induced changes.



Shifts in West Coast land cover classes, 1996–2001 (NOAA, 2003b).

Coastal Monitoring Data—Status of Coastal Condition

This section presents the monitoring data used to rate the five indices of coastal condition assessed in this report. These calculations do not include proportional-area and location data for the Great Lakes because, due to sampling design differences in the data sets, areal estimates for the Great Lakes cannot be determined. Although these two types of Great Lakes data are not presented in this section, the Great Lakes regional index and component indicator scores are included in the national scores. Chapter 7 provides further details of the Great Lakes monitoring data.



The NCA monitoring data used in this assessment were based on single-day measurements collected at sites throughout the United States during a 9- to 12-week period in late summer. Data were not collected during other time periods.

Water Quality Index

The water quality index for the nation's coastal waters is rated good to fair, with 6% of the coastal area rated poor and 34% rated fair for water quality condition (Figure 2-7). The water quality index was determined based on measurements of five component indicators: DIN, DIP, chlorophyll *a*, water clarity, and dissolved oxygen. Based on the NCA results, 40% of the nation's coastal waters experience a moderate-to-high degree of water quality degradation. Fair condition is generally characterized by degradation in water quality response variables (e.g., increased chlorophyll *a* concentrations or decreased dissolved oxygen concentrations). Although poor condition is characterized by some degradation in response variables, it is more likely to be characterized by degradation due to environmental stressors (e.g., increased nutrient concentrations or reduced water clarity). Although none of the regions outlined in this report are rated poor for water quality, the Gulf Coast region has the highest proportion of coastal area rated poor for this index (14%), followed by the Northeast Coast (13%) and Puerto Rico (9%) regions. The West Coast region has the lowest proportion of coastal area (23%) rated good for water quality.

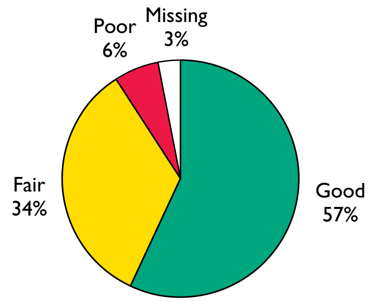


Figure 2-7. Water quality index data for the nation's coastal waters (U.S. EPA/NCA).

Nutrients: Nitrogen and Phosphorus

The nation's coastal waters are rated good for DIN concentrations, with only 1% of the coastal area rated poor. The highest percentage of coastal area rated poor for DIN concentrations occurred in the Northeast Coast (5%) region and Hawaii (5%). U.S. coastal waters are rated fair for DIP concentrations, with 8% of the coastal area rated poor for this component indicator and 53% of the area rated fair. Elevated DIP concentrations were most often observed in the coastal waters of the Gulf Coast region (22%).

Chlorophyll a

The nation's coastal waters are rated good for chlorophyll *a* concentrations, with 3% of the coastal area rated poor and 25% of the area rated fair for this component indicator. Puerto Rico was the only region of the country rated poor for chlorophyll *a* concentrations, with 71% of the region's coastal area rated fair and poor (combined) for this component indicator. Other regions with significant percentages of area rated fair and poor (combined) for chlorophyll *a* concentrations were the Southeast Coast (59%) and Gulf Coast (52%) regions. With the exception of Puerto Rico, none of the regions experienced large expanses of poor condition for chlorophyll *a* concentrations (Hawaii = 13%, Northeast Coast = 9%, Southeast Coast = 9%, and Gulf Coast = 7%).

Criteria for a Poor Rating (Percentage of Ambient Surface Light That Reaches a Depth of 1 Meter)	Coastal Areas
< 5%	Areas having high natural levels of suspended solids in the water (e.g., Louisiana, Delaware Bay, Mobile Bay, Mississippi) or extensive wetlands (e.g., South Carolina, Georgia).
< 20%	Areas having extensive SAV beds (e.g., Florida Bay, Indian River Lagoon, Laguna Madre) or desiring to reestablish SAV (e.g., Tampa Bay).
< 10%	The remainder of the country.

Water Clarity

The nation's coastal waters are rated fair for water clarity, with 17% of the U.S. coastal area rated poor for this component indicator. Sites with poor water clarity are distributed throughout the country, but the regions with the greatest proportion of total coastal area rated poor are the West Coast (36%), Gulf Coast (22%), Northeast Coast (20%), and Puerto Rico (20%) regions. Three different reference conditions were established for measuring water clarity conditions in U.S. coastal waters (see Chapter 1 for additional information). The box above shows the criteria for rating a site in poor condition for water clarity in estuary systems with differing levels of natural turbidity.

Dissolved Oxygen

Dissolved oxygen conditions in the nation's coastal waters are rated good, with 4% of the coastal area rated poor and 11% rated fair for this component indicator. The Northeast Coast region showed the greatest proportion of coastal area (9%) experiencing low dissolved oxygen concentrations.

The NCA measures dissolved oxygen conditions only in nearshore coastal waters and does not include observations of dissolved oxygen concentrations in offshore coastal shelf waters. The Gulf of Mexico hypoxic zone is the largest zone of anthropogenic coastal hypoxia in the Western Hemisphere (CAST, 1999), and the occurrence of hypoxia in Gulf of Mexico shelf waters is a well-known and documented phenomenon. Between 1989 and 1999, the mid-summer hypoxic zone in Gulf of Mexico bottom waters steadily increased in area to include nearly 8,000 mi^2. In 2000, the hypoxic zone decreased in area to less than 1,800 mi^2; however, the zone returned to about 8,000 mi^2 in area in 2001 and 2002 (the years covered by NCA surveys in this report). The reduction in the size of the hypoxic zone in 2000 corresponds to severe drought conditions in the Mississippi River watershed and, presumably, to decreased flow and loading to the Gulf of Mexico from the river mouth. The long-term (1985–2005) average area of the Gulf of Mexico hypoxic zone is 4,800 mi^2. A more complete discussion of the Gulf of Mexico hypoxic zone is provided in Chapter 5 of this report, *Gulf Coast Coastal Condition*.

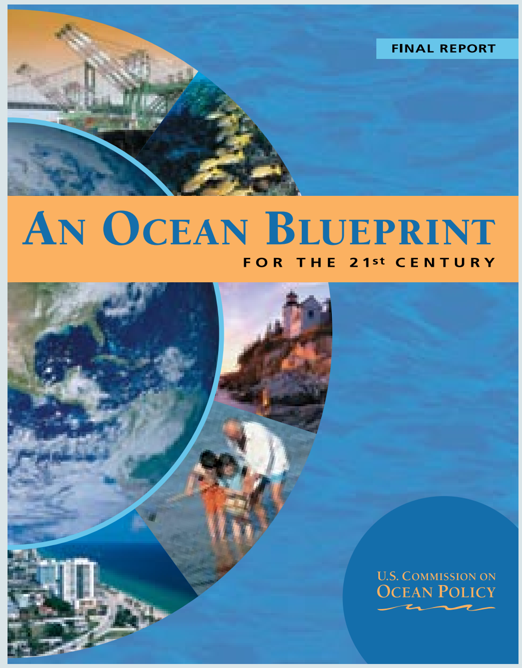
Interpretation of Instantaneous Dissolved Oxygen Information

Although the NCA results do not suggest that dissolved oxygen concentrations are a pervasive problem, the instantaneous measurements on which these results are based may have underestimated the magnitude and duration of low dissolved oxygen events at any given site. Longer-term observations by other investigators have revealed increasing trends in the frequency and areal extent of low-oxygen events in some coastal areas. For example, extensive year-round or seasonal monitoring data over multiple years in such places as North Carolina's Neuse and Pamlico rivers and Rhode Island's Narragansett Bay have shown a much higher incidence of hypoxia than is depicted in the present NCA data (Paerl et al., 1998; Bergondo et al., 2005; Deacutis et al., 2006). These data show that while hypoxic conditions do not exist continuously, they can occur occasionally to frequently for generally short durations of time (hours).

Highlight

A National Water Quality Monitoring Network for U.S. Coastal Waters and Their Tributaries

The annual cost of water quality monitoring in U.S. coastal waters and their tributaries is hundreds of millions of dollars. Yet, in recent years, numerous reports have indicated that water quality monitoring has been and remains insufficient and lacks coordination to provide comprehensive information about U.S. water resources. In 2004, the U.S. Commission on Ocean Policy recommended a national monitoring network to improve management of coastal resources (U.S. Commission on Ocean Policy, 2004a). In response, the Administration produced a *U.S. Ocean Action Plan* (CEQ, 2004), which included a proposal for the creation of a National Water Quality Monitoring Network as a key element for advancing our understanding of the oceans, coasts, and the Great Lakes. The network was designed by the National Water Quality Monitoring Council on behalf of the Advisory Committee on Water Information and in response to a request from the Council on Environmental Quality and two subcommittees of the National Science and Technology Council (NWQMC, 2006). Pilot-scale demonstrations of the proposed network are currently underway in select areas of the country (USGS, 2006a).



The proposed national water quality monitoring network for U.S. coastal waters and their tributaries (the "Network") shares many attributes with ongoing monitoring efforts, but is unique in that it uses a multidisciplinary approach to address a broad range of resource components, from upland watersheds to offshore waters. Specifically, the proposed Network has several key design features, including the following:

- Clear objectives linked to important management questions
- Linkage with the IOOS
- Integration of water resource components from uplands to the coast, including physical, chemical, and biological characteristics of water resources
- Flexibility in design over time
- Importance of metadata, QA procedures, comparable methodology, and data management that allow readily accessible data storage and retrieval.

This initial design of the proposed Network focuses on U.S. coastal waters and estuaries. Of the 149 estuaries included in the proposed Network design, 138 are in the conterminous United States and represent more than 90% of the total surface area of conterminous U.S. estuaries and over 90% of the total freshwater inflow. The sampling scheme for these estuaries includes the following:

(1) probability-based sampling of estuaries in each IOOS region (see map) to determine the environmental condition of individual estuaries, (2) targeted and flexible sampling to address estuary-specific resource management issues and to determine temporal trends of selected parameters, and (3) selection of sampling sites to determine short-term variability in parameters of interest, using moored, automated sensors. For nearshore waters and the Great Lakes, the proposed Network design calls for probability-based sampling supplemented with additional observations from shipboard surveys, satellite-mounted and aerial sensors, shore-based sensors, and autonomous underwater vehicles. Shipboard sampling and remote sensing will help to monitor the oceanic regime (NWQMC, 2006).

River monitoring is focused on sampling rivers that (1) represent 90% of the outflow of major inland watersheds, (2) flow directly into Network estuaries, and (3) flow directly into the Great Lakes and drain watersheds greater than 250 mi^2 in area. Network river monitoring will allow calculation of seasonal and annual fluxes of freshwater and loads of constituents from the uplands to coastal marine waters and the Great Lakes (NWQMC, 2006).

Physical, chemical, and biological constituents are to be monitored throughout the Network. Information about specific constituents to be monitored for each resource type; recommended monitoring frequencies; data management, comparability, storage, and access; metadata standards; and quality assurance/quality control (QA/QC) considerations are discussed in the Network report (NWQMC, 2006). The Network report and appendices are available at http://acwi.gov/monitoring/network/design.

Integrated Ocean Observing System geographic regions (Ocean. US, 2005b).

Sediment Quality Index

The sediment quality index for the nation's coastal waters is rated fair, with approximately 8% of the coastal area rated poor for sediment quality condition (Figure 2-8). The sediment quality index is based on measurements of three component indicators: sediment toxicity, sediment contaminants, and sediment TOC. The region showing the largest proportional area with poor sediment quality was Puerto Rico (61%), followed by the Gulf Coast (18%), West Coast (14%), and Northeast Coast (13%) regions. Although there are no areal estimates for poor sediment condition in the Great Lakes region (see Chapter 7 for more information), local, non-probabilistic surveys of that region resulted in a sediment quality index rating of poor. Hawaii and Southcentral Alaska were the only regions that were rated good or good to fair for sediment quality condition.

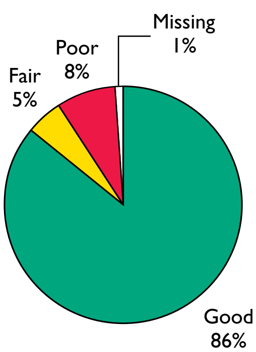


Figure 2-8. Sediment quality index data for the nation's coastal waters (U.S. EPA/NCA).

Sediment Toxicity

The sediment toxicity component indicator for the nation's coastal waters is rated good, with 4% of the U.S. coastal area rated poor for this component indicator. Sediment toxicity was observed most often in sediments of the West Coast (17%) and Gulf Coast (13%) regions.

Sediment Contaminants

The sediment contaminants component indicator for the nation's coastal waters is rated good. Poor sediment contaminant condition was observed in 3% of the coastal area, and fair condition was observed in an additional 5% of the coastal area. The highest proportion of area rated poor for sediment contaminants occurred in Puerto Rico (23%), followed by the Northeast Coast (9%) region. Although there are no areal estimates for poor sediment contaminant condition in the Great Lakes region, local, non-probabilistic surveys of that region produced results indicating a poor rating for this component indicator.

Sediment TOC

The nation's coastal waters are rated good for sediment TOC concentrations, with only 2% of the U.S. coastal area rated poor for this component indicator. The only region rated poor for this component indicator was Puerto Rico, where coastal sediments showed high levels of TOC in 44% of the coastal area.

Benthic Index

The benthic index for the nation's coastal waters is rated fair to poor, with 27% of the nation's coastal area rated poor for benthic condition (i.e., the benthic communities have lower-than-expected diversity, are populated by greater-than-expected pollution-tolerant species, or contain fewer-than-expected pollution-sensitive species, as measured by multi-metric benthic indices) (Figure 2-9). The regions with the greatest proportion of coastal area in poor benthic condition were the Gulf Coast (45%), Puerto Rico (35%), and Northeast Coast (27%) regions. The Southeast Coast and West Coast are the only regions where benthic condition was rated good. Data were unavailable to assess the integrity of benthic communities in Southcentral Alaska and Hawaii.

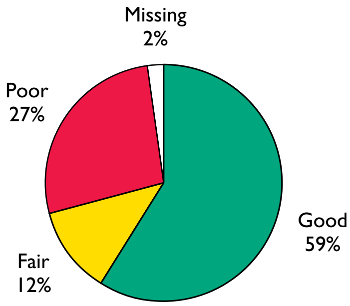
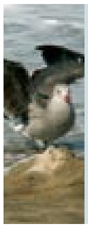


Figure 2-9. Benthic index data for the nation's coastal waters (U.S. EPA/NCA).

Coastal Habitat Index

The coastal habitat index ratings outlined in this report are the same as those reported in the NCCR II because more recent data on coastal habitat conditions were unavailable for this report. Although the loss of wetland habitats in the United States has been significant over the past 200 years, only small losses of coastal wetlands were documented from 1990 to 2000. Table 2-1 shows the change in wetland acreage from 1990 to 2000; the mean long-term, decadal loss rate of coastal wetlands from 1780 to 1990; and the coastal habitat index value for each region and the nation (including and excluding Alaska). It should be noted that coastal wetland acreages for Puerto Rico and Hawaii were unavailable in 2000, and the Great Lakes region was assessed using different methods. Also, the coastal wetland data presented in Table 2-1 for Alaska were for the entire state. Data for Southcentral Alaska were unavailable as a separate data set; therefore, a coastal habitat index score and rating for Southcentral Alaska could not be determined. In order to be consistent with the national coastal condition ratings for the other indices, the national coastal habitat rating is based on data for the conterminous United States and excludes the data from Alaska, Hawaii, Puerto Rico, and the Great Lakes region.



The coastal habitat index value is the average of the mean long-term, decadal loss rate of coastal wetlands (1780–1990) and the present decadal loss rate of coastal wetlands (1990–2000).

Table 2-1. Changes in Marine and Estuarine Wetlands, 1780–1990 and 1990–2000 (Dahl, 1990; 2003)

Coastline or Area	Area 1990 (acres)	Area 2000 (acres)	Change 1990–2000 (acres) (%)	Mean Decadal Loss Rate 1780–1990	Index Value
Northeast Coast	452,310	451,660	-650 (0.14%)	1.86%	1.00
Southeast Coast	1,107,370	1,105,170	-2,200 (0.20%)	1.91%	1.06
Gulf Coast	3,777,120	3,769,370	-7,750 (0.21%)	2.39%	1.30
West Coast	320,220	318,510	-1,710 (0.53%)	3.26%	1.90
Conterminous U.S. Coast (excluding Great Lakes region)	**5,657,020**	**5,644,710**	**-12,310 (0.22%)**	**2.30%**	**1.26**
Alaska	2,132,900	2,132,000	-900 (0.04%)	0.05%	0.05
Hawaii	31,150	No data	—	0.06%	—
Puerto Rico	17,300	No data	—	—	—
U.S. Coast (conterminous United States and Alaska)	**7,838,370**	**7,825,160**	**-13,210 (0.17%)**	**1.25%**	**0.71**

Highlight

Science-based Coastal Habitat Restoration

Restoration is the process of reestablishing a self-sustaining habitat that, in time, can evolve to closely resemble a natural condition in terms of structure and function (Turner and Steever, 2002). The five key elements necessary for successful restoration include the following:

- Reinstatement of ecological processes
- Integration with the surrounding environment
- Development of a sustainable, resilient system
- Re-creation of the historic type of physical habitat that may not always result in the historic biological community structure
- Development of a planning process with specific project goals and performance standards for measuring achievement of restoration goals (Society of Wetland Scientists, 2000).

Habitat restoration is a relatively new science. Early restoration efforts frequently took a shotgun approach, with limited planning and limited or no monitoring of project results. Unfortunately, these efforts had limited success. The philosophy seemed to be that if a project was completed, nature would ensure that the newly reestablished habitat would persist, all the component parts would reappear independently, and the habitat would be wholly functional again. However, in recent years, there have been many advances in the design of restoration projects, the setting of project goals, and the scientific approach to research and monitoring of these projects (Thayer and Kentula, 2005). Stakeholder involvement, appropriate goal setting, and science-based monitoring are

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SCIENCE-BASED RESTORATION MONITORING OF COASTAL HABITATS

Volume Two: Tools for Monitoring Coastal Habitats

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Researchers observe the progress at a restoration site in Palmetta Estuary, Manatee County, FL (courtesy of Mark Sramek, NOAA).

critical to the success of both small- and large-scale restoration projects. Restoration monitoring contributes to our understanding of complex ecological systems. Monitoring is also essential in documenting restoration performance and adapting project designs based on performance, which should lead to more effective restoration project results (Thayer et al., 2003; 2005).

The book *Science-Based Restoration Monitoring of Coastal Habitats* (Thayer et al., 2003) lays out the steps for a scientifically based restoration monitoring plan that includes the following:

- Identification of project goals
- Collection of information on similar restoration projects to aide in maximizing efficiency of approaches
- Identification and description of the habitats within the area
- Identification of the basic structural and functional characteristics for those habitat types
- Consultation with experts (e.g., hydrologists, soils experts, botanists, ecologists)
- Development of hypotheses regarding the trajectories of restoration development and recovery
- Collection of historical data for the area
- Selection of reference sites that can be used to evaluate restoration progress
- Agreement on the length of time the project will be monitored
- Selection of monitoring techniques to be used
- Design of a monitoring review and revision process
- Development of a cost estimate for implementation of the monitoring plan.

The incorporation of a scientific approach into the design of the restoration monitoring plan will provide for more successful habitat restoration (Turner and Steever, 2002) and incorporate the five elements considered essential by the Society of Wetland Scientists (2000).

Understanding of the value of restoring degraded and damaged habitats has increased in the past decade, and the U.S. Congress recognized this growing interest through the Estuary Restoration Act, Title 1 of the Estuaries and Clean Waters Act of 2000. Over time, better techniques have been developed, results of restoration have been more successful, and statistical rigor has been applied to both restoration and monitoring activity. Additionally, it has become increasingly evident that decisions regarding habitat restoration cannot be made entirely by using ecological parameters alone, but must involve consideration of the effects on and benefits to humans (Thayer et al., 2005).

A soil conservation technician examines sea oats recently planted to stabilize erosion during hurricanes and severe storms (courtesy of Bob Nichols, Natural Resources and Conservation Service [NRCS]).

From 1990 to 2000, the conterminous United States lost approximately 12,310 acres of coastal wetlands (exclusive of the Great Lakes region), resulting in a loss rate of about 0.2%. Averaging this recent rate of decadal wetland loss with the mean long-term decadal loss rate (2.3%) results in a coastal habitat index value of 1.26 and a rating of poor for the nation's coastal waters. The largest index values were seen in the West Coast (1.90) and Gulf Coast (1.30) regions, which are both rated poor. Because Gulf Coast wetlands constitute two-thirds of the coastal wetlands of the conterminous United States, and the Gulf Coast coastal habitat index value is high, the overall national rating for the coastal habitat index is poor (index value of 1.26). For the Great Lakes region, researchers used other measurement approaches to assess wetland losses and rated this region as fair to poor for coastal habitat condition. Figure 2-10 compares the national and regional percentages of wetlands lost.

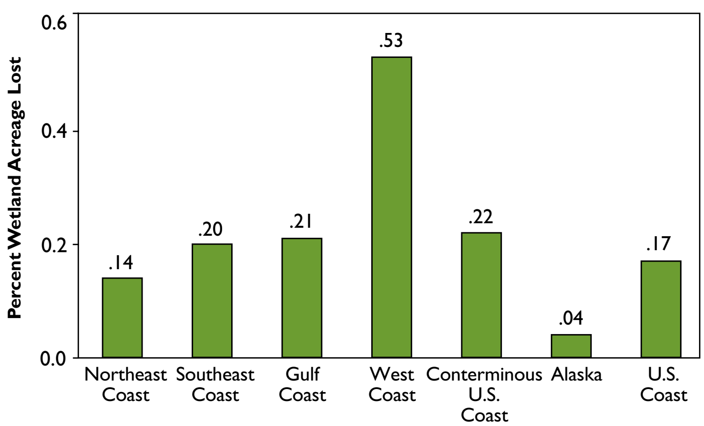

Figure 2-10. Percentage of wetland area loss, 1990–2000 (Dahl, 2003).

Fish Tissue Contaminants Index

The fish tissue contaminants index for the nation's coastal waters is rated fair. Figure 2-11 shows that 18% of all stations where fish were caught demonstrated contaminant concentrations in fish tissues above EPA Advisory Guidance values and were rated poor. The NCA examined whole-body composite samples (typically 4 to 10 fish of a target species per station) for specific contaminants from 1,277 stations throughout the coastal waters of the United States (excluding Hawaii and Puerto Rico). To standardize sampling methods across the United States and to coordinate the fish sampling when other NCA coastal samples were collected each year and across sampling years, the fish and shellfish that were collected were typically demersal (bottom-dwelling) and slower-moving pelagic (water-column-dwelling) species, usually smaller, younger juveniles. While the fish caught and analyzed may not exhibit commercial-grade consumable qualities, they do represent intermediate trophic-level (position in the food web) species that serve as prey for larger fish that may be of commercial size and value. Fish and shellfish analyzed included Atlantic croaker, white perch, catfish, flounder, scup, blue crab, lobster, shrimp, whiffs, mullet, tomcod, spot, weakfish, halibut, soles, sculpins, sanddabs, bass, and sturgeon. Stations in poor and fair condition were dominated by samples with elevated concentrations of total PCBs, total DDT, total PAHs, and mercury. In the Northeast Coast region, 31% of the fish samples analyzed were rated poor for fish tissue contaminant levels and 28% were rated fair (the Northeast Coast showed poor or fair condition for more than 50% of the fish samples analyzed). Southcentral Alaska and the Gulf Coast region were the only regions that received good ratings for the fish tissue contaminants index.

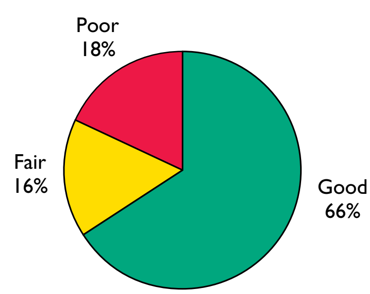

Figure 2-11. Fish tissue contaminants index data for the nation's coastal waters (U.S. EPA/NCA).